CS 169 / CS 268: Introduction to Optimization

Fall 2026 | University of California, Irvine

Website: `https://panageas.github.io/optimization2026.html`

Instructor: Ioannis Panageas, ipanagea@ics.uci.edu
Office hours: By appointment.

Teaching assistant: Parnian Shahkar, shahkarp@uci.edu
Office hours: To be announced on EdStem.

Teaching assistant: Aidan Sciortino, asciorti@uci.edu
Office hours: To be announced on EdStem.

Lectures: Tuesdays and Thursdays, 3:30–4:50 p.m., ICS 174 (in person).

Course format: CS 169 is the undergraduate course and CS 268 is the graduate course. The courses meet together and share the lecture schedule. Assessments will be distinct for CS 169 and CS 268, with the same grading weights. Requirements will be identified in each assessment.

EdStem: Announcements and questions about course material and homework will use EdStem. Please check EdStem frequently; email the instructor for personal matters.

Course description and preparation

A broad introduction to optimization: unconstrained and constrained optimization, linear and integer programming, combinatorial and geometric optimization, optimization applications to AI/ML.

Prerequisite preparation: (I&C SCI 6N or MATH 3A), (MATH 2B or AP Calculus BC with a minimum score of 4), and COMPSCI 161, or equivalent preparation.

Recommended textbook: Edwin K. P. Chong, Wu-Sheng Lu, and Stanislaw H. Żak, *An Introduction to Optimization*, fifth edition. See the authors' textbook page. Additional readings will be announced.

Learning outcomes

Students will learn to classify optimization problems; formulate linear and integer programs; apply first- and second-order optimality conditions; implement gradient descent and Newton's method; and explain optimization in regression, neural-network training, and combinatorial problems. CS 268 additionally emphasizes proofs about convexity and optimality, derivation of KKT conditions, linear-programming duality and complementary slackness, algorithmic tradeoffs, and critical evaluation of optimization research.

Grading policy

- **Three homeworks (15% total; 5% each).** Each student must work individually. Assignments, due dates, and submission instructions will be announced on EdStem. The tentative schedule places the three homeworks in Weeks 2, 5, and 10; exact deadlines will be announced.
- **Three midterm exams (75% total; 25% each).** Exams will be held in person during the regular class period in ICS 174. One hour is allocated to the exam; the remaining time is for administration. Approved accommodations will be honored.
  - Midterm 1: Thursday, October 15, 2026.
  - Midterm 2: Thursday, November 5, 2026.
  - Midterm 3: Thursday, December 3, 2026.
- **Take-home final project (10%).** The project is the final assessment. There is no in-person final exam. The project brief, permitted resources, submission instructions, and deadline will be announced on EdStem.

Total: 100%. These weights apply to both CS 169 and CS 268.

Missed-midterm policy

If you need to miss a midterm, for any reason, you must obtain the instructor's approval. If the instructor accepts the reason, the points of the missing midterm will be allocated equally among the other grading components. A midterm may not be skipped without approval.

For reasons you could have known about in advance, contact the instructor as soon as possible after the conflict is known. If the conflict could have been known before the exam, relief will not be provided when the instructor is informed only after the exam, unless it would have been unreasonable to contact the instructor beforehand. If you need to miss an exam, or if you do miss an exam, email the instructor as soon as possible upon knowing this.

There will be no makeup exam under this policy. This policy does not limit approved disability accommodations or other accommodations required by University policy.

EdStem and course communication

EdStem is intended as an open and respectful forum for exchanging questions and answers about the class and course material. Inappropriate, insulting, or offensive posts will not be tolerated. Such posts may be removed and may result in suspension or termination of forum access; serious cases may be referred to the appropriate University office. Necessary course information will remain available to enrolled students.

Post questions of general interest on EdStem. Do not post your solutions or another student's work publicly. Contact the instructor privately about absences, accommodations, or other personal matters.

Schedule of classes (tentative)

The topic order follows the optimization course outline. The first meeting is Thursday, September 24. Week 1 begins September 28. Midterms occur during the Thursday meeting in Weeks 3, 6, and 10. Topics and readings may be adjusted; updates will be posted on EdStem and the course website.

Week / dates	**Topics**	**Reading**	**Assessments / notes**
Opening: Sept. 24	Administrivia and Introduction	—	First lecture
1: Sept. 29, Oct. 1	Convex sets and functions; first-order conditions; Taylor's theorem	Ch. 1–5	Lectures
2: Oct. 6, 8	Linear programming, simplex method, and modeling examples	Ch. 15–17	Homework 1; deadline TBA
3: Oct. 13, 15	Integer programming, combinatorial optimization, and matching examples	Ch. 19	**Midterm 1: Thu., Oct. 15**
4: Oct. 20, 22	Gradient descent and variants	Ch. 8	Lectures
5: Oct. 27, 29	Stochastic optimization and stochastic gradient descent	Ch. 27	Homework 2; deadline TBA
6: Nov. 3, 5	Newton's method	Ch. 9	**Midterm 2: Thu., Nov. 5**
7: Nov. 10, 12	PCA; linear and logistic regression	Ch. 26, 28, 29	Lectures
8: Nov. 19	Training neural networks; backpropagation	Ch. 13	**No lecture on Nov 17**
9: Nov. 24, 26	KKT conditions; second-order conditions and saddle points	Ch. 21	**Thu., Nov. 26: Thanksgiving; no class**
10: Dec. 1, 3	KKT conditions; second-order conditions and saddle points	Ch. 21	**Midterm 3: Thu., Dec. 3.** Homework 3; deadline TBA

Readings refer to the recommended textbook and are tentative. Lecture slides will be posted for each class.

Take-home final project: Details and deadline to be announced. No in-person final exam is scheduled for this course.

Calendar: Instruction ends December 4. Thanksgiving is November 26–27; the Thursday meeting on November 26 is canceled. See the UCI Fall 2026 academic calendar.

Academic integrity and honor code

Academic dishonesty is a serious offense. Students must comply with the UCI Academic Integrity Policy and the course-specific rules below. These expectations apply to homework, midterms, and the take-home project in both courses.

- Submit your own work. Homework must be completed individually. Follow the project brief's collaboration and resource rules; ask the instructor before using assistance that is not expressly permitted.
- Do not copy from others, share answers, or allow another student to copy your work during an exam.
- Do not use unauthorized materials, electronic devices, online services, or assistance during an exam. Permitted resources will be specified for each assessment.
- Do not present another person's writing, proofs, code, or solutions as your own. Cite permitted sources and acknowledge permitted assistance.
- Do not alter graded work and then submit it for additional credit. Do not fabricate results or otherwise misrepresent your work.

Generative AI

For homework and the take-home project, generative AI tools may be used only to improve writing, spelling, or grammar, unless the instructor expressly permits another use. AI-generated mathematical solutions, proofs, or code are not permitted without that authorization. Any use must be acknowledged, and students remain responsible for the accuracy and authorship of their submitted work. Generative AI is not permitted during midterms unless expressly authorized.

Consequences and University procedures

Academic dishonesty will ordinarily result in an F in the course. Suspected violations will be reported to the Office of Academic Integrity and Student Conduct (OAISC). OAISC determines responsibility and administrative sanctions; the instructor handles course-grade consequences under University policy. Students retain the notice, response, and appeal rights provided by that policy.

Consult the UCI Academic Integrity Policy and OAISC academic-integrity resources. Ask the instructor before submitting work if a rule is unclear.

Accessibility and accommodations

Students seeking disability-related accommodations should contact the UCI Disability Services Center (DSC) and request that their accommodation letters be sent to the instructor. Please discuss implementation early, especially for exams. Approved accommodations will be honored; the missed-midterm policy does not replace this process.

If course materials or an EdStem activity present an access barrier, email ipanagea@ics.uci.edu promptly so that we can arrange accessible access.